

REVIEW OF THE NEW WORLD TREEHOPPER TRIBE STEGASPIDINI
(HEMIPTERA: MEMBRACIDAE: STEGASPIDINAE): III: *FLEXOCENTRUS*
GODING, *STYLOCENTRUS* STÅL, AND *UMBELLIGERUS* DEITZ

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Abstract.—Three genera in the treehopper tribe Stegaspidini Haupt—*Flexocentrus* Goding, *Stylocentrus* Stål, and *Umbelligerus* Deitz—are redescribed and illustrated based on adult and nymphal morphology. One **new synonymy** is included in this work: *Flexocentrus brunneus* Funkhouser is a **new junior synonym** of *F. felinus* (Haviland). *Flexocentrus* is now a monotypic genus; *Stylocentrus* and *Umbelligerus* have three valid species each. Updated taxonomic keys are given for *Stylocentrus* and *Umbelligerus* and a complete species checklist, including synonymies, is given for each genus.

Key Words: Membracidae, Stegaspidini, *Flexocentrus*, *Stylocentrus*, *Umbelligerus*, taxonomy

This work, the third in a series of three publications on the tribe Stegaspidini, includes redescrptions of the genera *Flexocentrus* Goding, *Stylocentrus* Stål, and *Umbelligerus* Deitz. The genera *Bocydium* Latreille, *Lirania* Stål, and *Smerdalea* Fowler were addressed in part I (Cryan and Deitz 1999a); *Lycoderes* Germar, *Oeda* Amyot and Serville, and *Stegaspis* Germar were treated in part II (Cryan and Deitz 1999b). Part I also included an introduction to this review series, explanations and illustrations of relevant morphological features, a redefinition of the tribe Stegaspidini, and a taxonomic key for the identification of included genera.

MATERIALS AND METHODS

Methods used in this work were described in part I (Cryan and Deitz 1999a). A superscript 1 denotes species distribution records from Metcalf and Wade (1965a)

that have not been confirmed in this work. Unverified distribution records from the literature should be used with caution, as some may be based on misidentified specimens. The following codens are used herein to refer to the collections in which relevant specimens are located or have been deposited. Arnett et al. (1993a) listed the full postal addresses for most of the institutions; those not found in that publication are indicated by a dagger (†) following the coden.

- AMNH: American Museum of Natural History, New York, New York, USA.
BMNH: Department of Entomology, The Natural History Museum, London, United Kingdom.
BYUC: Entomology Section, Monte L. Bean Life Science Museum, Brigham Young University, Provo, Utah, USA.

CNCI: Canadian National Collection of Insects, Eastern Cereal and Oilseed Research Centre, Agriculture and Agri-Food Canada, Research Branch, Ottawa, Ontario, Canada.

DZUP: Museu de Entomologia Pe. Jesus Santiago Moure, Universidade Federal do Paraná, Departamento de Zoologia, Curitiba, Paraná, Brazil.

EMUS: Entomological Museum, Department of Biology, Utah State University, Logan, Utah, USA.

INBC: Instituto Nacional de Biodiversidad, Santo Domingo, Costa Rica.

IZAV: Instituto de Zoología Agrícola, Universidad Central de Venezuela, Maracay, Aragua, Venezuela.

MZLU: Museum of Zoology, Lund University, Helgonavägen, Lund, Sweden.

NCSU: North Carolina State University Insect Collection, Department of Entomology, North Carolina State University, Raleigh, North Carolina, USA.

QCAZ: Quito Catholic Zoology Museum, Departamento de Biología, Pontificia Universidad Católica del Ecuador, Quito, Ecuador.

SEMC: Snow Entomological Museum, University of Kansas, Lawrence, Kansas, USA.

SHMC†: S. H. McKamey Collection, currently at the United States Department of Agriculture, Agricultural Research Service, Systematic Entomology Laboratory, % National Museum of Natural History, MRC-168, Washington, D.C., USA.

TKWC†: T. K. Wood Collection, currently at the Department of Entomology and Applied Ecology, University of Delaware, Newark, Delaware, USA.

UCDC: The Bohart Museum of Entomology, University of California at Davis, Davis, California, USA.

USNM: Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA.

The location and structure of suprahumeral horns vary greatly within the tribe Stegaspidini, and even within some genera; nevertheless, the nature of these pronotal extensions usually provides excellent taxonomic features at the specific and generic levels. We consider any pronotal extensions located above the humeral angles to be suprahumeral horns. Thus, the unbranched 'horns' of *Flexocentrus felinus* (Haviland) (Figs. 2–3), the stalked bulbs of *Bocydium* spp. (Cryan and Deitz 1999a: figs. 9, 11, 13), and the spinelike lateral projections of *Stylocentrus* spp. and *Umbelligerus* spp. (Figs. 11, 18, 24, 30–32) are homologous.

Genus *Flexocentrus* Goding, 1926a

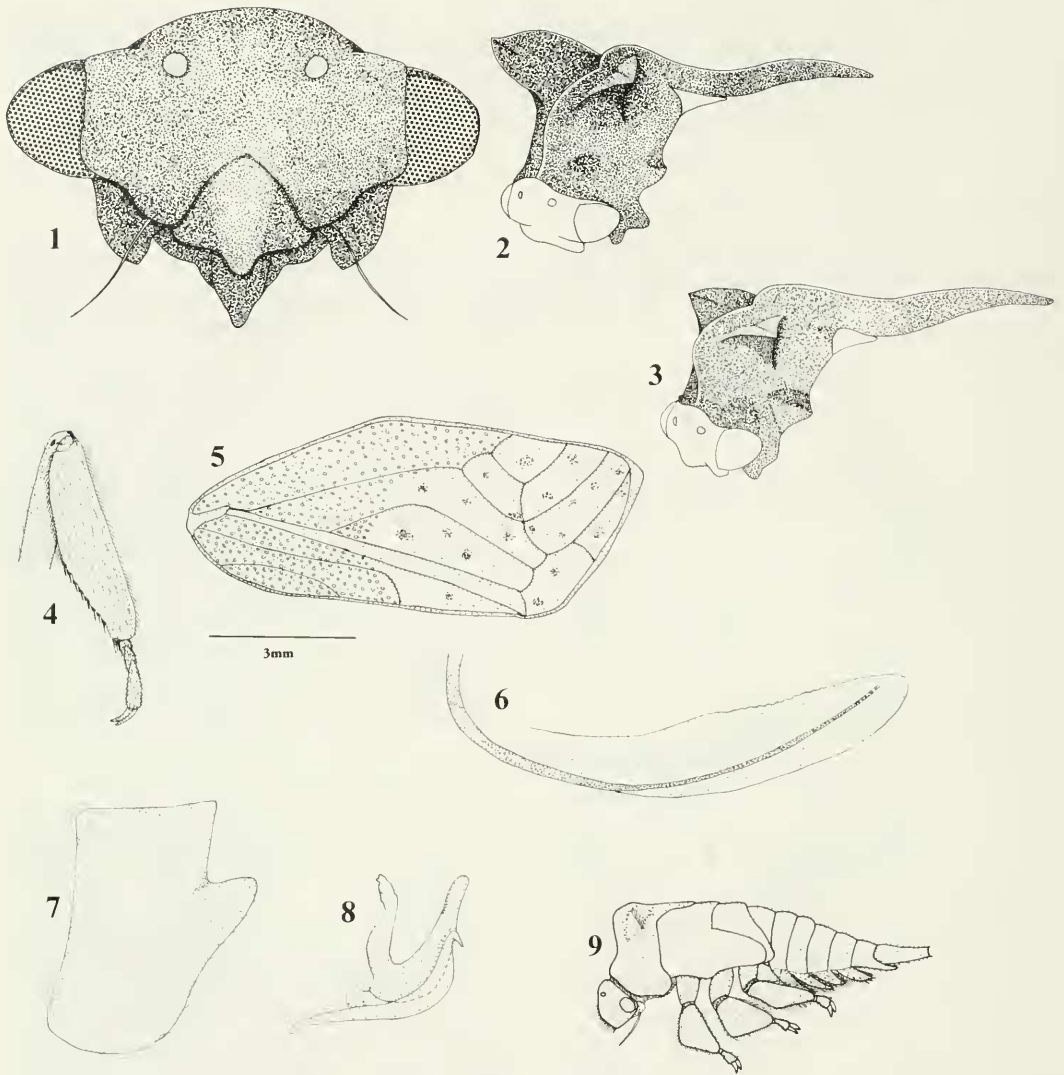
Flexocentrus Goding 1926a: 106. Type species: *Centruchoides felinus* Haviland 1925a: 257, by original designation and monotypy.

Diagnosis.—The genus *Flexocentrus* differs from other stegaspidine genera in having foliaceous tibiae and a long, triquetrous posterior pronotal process close to the scutellum for its entire length. The suprahumeral horns are stout and unbranched.

Adult.—*Dimensions* (mm): Total length 5.1–7.6. *Structure: Thorax: Pronotum* (Figs. 2–3): Suprahumeral horns and posterior process simple, unbranched. *Pronotal surface sculpturing* (Fig. 38): Punctate; each puncture (pit) associated with 1 long, narrow seta. *Scutellum* (Figs. 2–3): Emarginate apically. *Forewing* (Fig. 5): Venation simple; vein R_{2+3} fused basally with R_1 . *Genitalia*: ♀: 2nd valvulae (Fig. 6) curved dorsally. ♂: Lateral plates (Fig. 7) fused to pygofer.

Range.—Brazil to Venezuela.

Remarks.—This genus superficially re-



Figs. 1–9. *Flexocentrus felinus*. 1, Head of lectotype, anterior aspect (face). 2–3, Head, pronotum, and scutellum, anterolateral aspect (female lectotype of *F. felinus* and male holotype of *F. brunneus*, respectively). 4, Left metathoracic femur, tibia, and tarsus, ablateral aspect. 5, Left forewing of lectotype. 6, Female second valvulae, lateral aspect. 7, Male left lateral plate (fused to pygofer), lateral aspect. 8, Male aedeagus and left style, lateral aspect. 9, Late-instar nymph, lateral aspect.

sembles a new genus to be described in the tribe Microcentrini (Cryan and Deitz, in press), but differs in the characters diagnostic for the tribe Stegaspidini (forewing with one r-m and one m-cu crossvein, and vein R_{2+3} fused basally with R_1 ; Cryan and Deitz 1999a). The generic name *Flexocentrus* is a combination of the Latin terms “*flexo*” (from “*flexus*,” meaning “bend”)

and “*centrus*” (from “*centrum*,” meaning “spur or spike”), probably referring to the slight bend at the midpoint of the posterior pronotal process.

Flexocentrus felinus (Haviland)
(Figs. 1–9, 38)

Centrichoides felinus Haviland 1925a: 276.
Flexocentrus felinus: Goding 1926a: 106.

Flexocentrus brunneus Funkhouser 1930a:
410, **new synonymy.**

Type locality.—Kartabo, Guyana.

Diagnosis.—*Flexocentrus felinus* has foliaceous tibiae, unbranched suprahumeral horns, and a long, triquetrous posterior pronotal process close to the scutellum for its entire length.

Adult.—*Dimensions* (mm): Total length ♀ 5.8–7.6, ♂ 5.1–6.4; width between humeral angles ♀ 2.1–2.9; ♂ 1.9–2.4; pronotal length ♀ 4.6–6.3, ♂ 4.3–5.1; wing length ♀ 5.4–6.7, ♂ 4.4–5.4; maximum width of head across eyes ♀ 2.0–2.5, ♂ 1.8–2.3. *Coloration*: Body ranges from light brown to dark brown; posterior pronotal process often with a pale stripe basally; legs uniformly brown except for metathoracic tibiae, with distal ½ light brown; forewings either entirely brown or with basal ½ brown and distal ½ hyaline (with brown spots); abdomen light brown. *Structure*: *Head*: Face (Fig. 1) bearing fine pubescence; postclypeus trilobed, lateral lobes extending beneath foliate lobes; dorsal projections indistinct. *Thorax*: *Pronotum* (Figs. 2–3): Covered with fine pubescence; metopidial sulci more or less distinct; humeral angles weakly produced; suprahumeral horns simple, extending laterally (suprahumeral horns of females are longer than those of males); posterior process with slight dorsal swelling at base; posterior process triquetrous, spinelike, extending to about ⅔ length of forewings (at rest); dorsal margin slightly sinuate, with low median carina extending entire length. *Pronotal surface sculpturing* (Fig. 38): Pits generally round, moderately deep; bases of pit-associated setae slightly raised. *Scutellum* (Figs. 2–3): Short, elevated basally, then flattened to emarginate apex. *Legs* (Fig. 4): Tibiae foliaceous; metathoracic femur with 2 apical, cucullate setae; metathoracic tibiae with enlarged setal rows I and II distinct (row III obscure), with cucullate setae in row II only; first metathoracic tarsomere with 1 apical cucullate seta. *Forewing* (Fig. 5):

Wing shape quadrate, basal ½ thickened, punctate (except area between vein Cu and claval suture); venation simple; r-m cross-vein often in direct line with r. *Genitalia*: ♀: 2nd valvulae (Fig. 6) curved dorsally, slightly broadened at midlength, tapering distally, with small dorsal serrations on broadened area. ♂: Lateral plates (Fig. 7) fused to pygofer; styles (Fig. 8) hooked apically; anterior margin of aedeagus (Fig. 8) sinuate in lateral aspect, anterior face of posterior arm with preapical area denticulate.

Late-instar nymph (Fig. 9).—Pronotum produced medially, bearing raised ridges in the approximate positions of the adult suprahumeral horns; body brown, surface granulate; tibiae strongly foliaceous (almost triangular) and fringed with setae; lateral lamellae, present on abdominal segments 4–8, also fringed with setae.

Distribution.—Brazil [DZUP]; Ecuador [USNM]; French Guiana [NCSU]; Guyana [SHMC]; Venezuela [IZAV].

Material examined.—*Flexocentrus felinus* (Haviland): Lectotype [♀] [BMNH] with labels: "Type", "LECTO-/TYPE", "Kartabo./Brit. Guiana./B.M. 1924-519.", "Kartabo, Brit. Guiana/July, 1922/e coll. M.D. Haviland/d.d. Collegium Newnhamsense", "Centruchoides/felinus/Haviland", and "LECTOTYPE/♀/Centruchoides/felinus/Havil./P.S. Broomfield, 1968.". Paralectotype [♂] [BMNH] with labels: "Para-/type", "PARA-/LECTO-/TYPE", "Kartabo./Brit. Guiana./B.M.1924-519.", "Kartabo, Brit. Guiana/July, 1922/e coll. M.D. Haviland/d.d. Collegium Newnhamsense", "Centruchoides/felinus/Haviland", and "PARA-LECTOTYPE/Centruchoides/felinus/Havil./P.S. Broomfield, 1969.". *Flexocentrus brunneus* Funkhouser: Holotype [♂] [USNM] with labels: "Mackenzie/Demerara R./BRIT.GUIANA/June 24 '27", "Cornell U./Lot 760/Sub 108", "Deitz Research/71-293e ♂", "WDFunkhouser/Collection/1962", and "HOLOTYPE/Flexocentrus brunneus/W.D. Funkhouser". Other specimens: 4 ♀ from

SHMC; 2 ♀ and 1 ♂ from USNM; 1 ♀ and 2 ♂ from BMNH; 10 ♀ and 5 ♂ from IZAV; 5 ♀, 1 ♂, and 1 ♀ nymphal exuviae (including Deitz Research #71-260c ♀ and Deitz Research #71-260b ♂) from NCSU; and 1 ♀ (Cryan Research #93-204b ♀) from DZUP.

Remarks.—Haviland (1925a) described *Centruchoides felinus* from four female specimens and one male. In 1930, Funkhouser described *Flexocentrus brunneus* from a single male collected in British Guiana, but no comparison was made to *F. felinus* in his original description.

Flexocentrus brunneus is here considered to be a junior synonym of *F. felinus*, based on examinations of 14 male and 26 female specimens (including the types of both nominate species). Moreover, *F. felinus* is sexually dimorphic with respect to pronotal shape. Females are more robust, with longer suprahumeral horns (Fig. 2) than males (Fig. 3). The male holotype of *F. brunneus* is identical with the male paralectotype of *F. felinus*.

Although Deitz (1975a) reported that males lack lateral plates, the presence of distinct lateral lobes on the posterior margins of the pygofer (Fig. 7) suggest rather that the lateral plates are fused to the pygofer, with the lateral lobes representing the apices of the original plates.

Adults and nymphs can be found together on host plants in small colonies that are attended by ants (Haviland 1925a); McKamey (personal communication) observed nymphs with ant attendants, whereas nearby adults were apparently not attended. The late-instar nymph bears slightly raised ridges on the pronotum in the same position as, and apparently corresponding to, the adult suprahumeral horns. Host plant records are limited to the following: McKamey (personal communication) collected *F. felinus* from *Vismia* spp. (Guttiferae), and Haviland (1925a) described one host as a "slender, straggling tree, common in open places, [which] had the twigs and undersides of the leaves covered with rusty brown powder."

McKamey noted that Haviland's description is consistent with *Vismia* sp.

The Latin specific name, "*felinus*," translates as "of cats," perhaps comparing the pronotal horns to the ears of cats.

Genus *Stylocentrus* Stål 1869a

Stylocentrus Stål 1869a: 49. Type species: *Bocydium ancora* Perty 1833a, by monotypy.

Diagnosis.—The genus *Stylocentrus* has the suprahumeral horns and the posterior pronotal process simple, spinelike, and elongate. The posterior pronotal process is elevated far above the scutellum. The ocelli are stalked.

Adult.—*Dimensions* (mm): Total length 5.4–7.5. *Structure: Head* (Figs. 10, 17, 23): Face usually bearing waxy secretions in variable patterns; ocelli on raised tubercles; eyes slightly stalked. *Thorax: Pronotum* (Figs. 11, 18, 24): Usually bearing pale waxy secretions (Fig. 39) in variable patterns; suprahumeral horns and posterior process elongate, simple, with slightly raised ridges; posterior process raised above scutellum for its entire length; humeral angle produced to various degrees; metopidium with distinct callosities. *Pronotal surface sculpturing* (Fig. 39): Punctate, each pit associated with 1 long, narrow, seta; some pits appearing as oblong slits rather than round punctures; pronotal surface tuberculate between pits. *Scutellum* (Figs. 11, 18, 24): Short, elevated anteriorly, then flattening to acuminate apex. *Legs* (Fig. 12): Metathoracic femur with 1–3 apical, cucullate setae dorsally; metathoracic tibiae with enlarged setal rows I, II, and III distinct; row I with 1–3 cucullate setae distally, row II with cucullate setae throughout, row III with setae cucullate in apical 1/3; first metathoracic tarsomere with 1 apical cucullate seta. *Forewing* (Figs. 13, 19, 25): Venation simple; 1 r-m crossvein; 1 m-cu crossvein. *Genitalia*: ♀: 2nd valvulae either of uniform width (Fig. 14) or slightly broadened at midlength (Figs. 20, 26). ♂:

Lateral plates either free (Fig. 21) or fused to pygofer, lacking hooks on posterior margins (Figs. 15, 27); styles (parameres) either hooked (Figs. 22, 28) or clubbed (Fig. 16) apically.

Range.—South America (from about 15°S) to Costa Rica.

Remarks.—Morphologically, *Stylocentrus ancora* appears to have more derived features than either *S. championi* or *S. rubrinigris*. For example, both *S. championi* and *S. rubrinigris* have the pronotal processes unstalked and weakly produced humeral angles, whereas *S. ancora* has the pronotal processes stalked and strongly produced humeral angles. The male lateral plates of *S. championi* are free, whereas those of *S. rubrinigris* are fused to the pygofer (as in the more derived Stegaspidini), indicating that of these two species, *S. championi* is probably the more plesiomorphic taxon.

Although Deitz (1975a) reported that *Stylocentrus* species lack cucullate setae in metathoracic tibia setal row I, all three species of this genus bear 1–3 cucullate setae near the apex of this row. They are, however, smaller than the cucullate setae in rows II and III.

The generic name is a combination of the terms “*stylo*” (from the Greek “*stylos*,” meaning “pillar or column”) and “*centrus*” (from the Latin “*centrum*,” meaning “spur or spike”).

and body coloration brownish; tibiae light with dark band proximally
. *S. rubrinigris* Funkhouser

Stylocentrus ancora (Perty)
(Figs. 10–16)

- Bocydium ancora* Perty 1833a: 179.
- Bocydium trispinosum* Guérin-Ménéville 1844a: 367.
- Stylocentrus ancora*: Stål 1869a: 49.

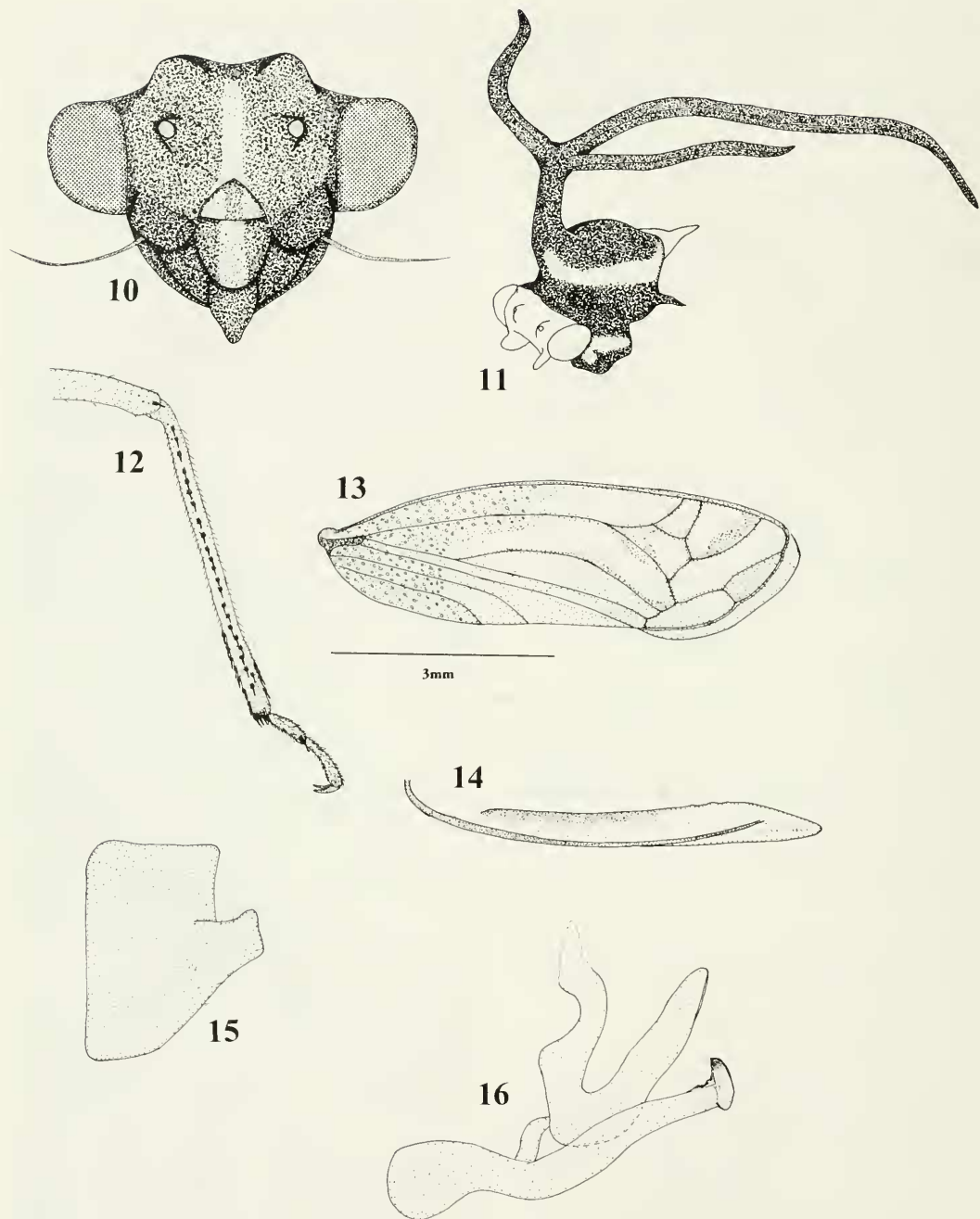
Type locality.—Minas Gerais, Brazil.

Diagnosis.—*Stylocentrus ancora* has the suprahumeral horns and the posterior pronotal process arising from a slender stalk; the humeral angles are produced into acute spines.

Adult.—*Dimensions* (mm): Total length ♀ 6.6–7.5, ♂ 6.4–7.2; width between humeral angles ♀ 2.1–2.4, ♂ 2.0–2.3; pronotal length ♀ 6.2–6.6, ♂ 6.1–6.4; wing length ♀ 5.6–5.8, ♂ 5.4–5.7; maximum width of head across eyes ♀ 1.5–1.6, ♂ 1.4–1.5. *Coloration*: Head and thorax black, usually with pale, waxy secretions; scutellum very lightly pigmented (nearly yellow; elevated area may or may not bear waxy secretions); legs light brown proximally, dark from base of tibia to apex of tarsi; forewing brown basally, hyaline from about 0.3× their length with brown pigments surrounding veins, making veins appear thickened; abdomen light brown to light red. *Structure: Head*: Face (Fig. 10) with fine pubescence; ocelli (on tubercles) located below strongly produced dorsal projections; frons with expanded, anteriorly directed plates to either side of postclypeus. *Thorax: Pronotum* (Fig. 11): Suprahumeral horns and posterior process arising from long stalk; suprahumeral horns curving posteriorly; posterior process extending to tips of forewings; metopidial region (posterior to dorsal border with head) sunken. *Pronotal surface sculpturing*: Bases of pit-associated setae slightly raised. *Scutellum* (Fig. 11): Short, elevated anteriorly, then flattening to acuminate apex; flattened region rising slightly from body. *Forewing* (Fig. 13): Basal 1/3 coriaceous, excluding

KEY TO SPECIES OF ADULT *STYLOCENTRUS*

- 1. Pronotum with suprahumeral horns and posterior process arising from very short stalk (Figs. 18, 24); humeral angles not well developed 2
- Pronotum with suprahumeral horns and posterior process arising from long stalk (Fig. 11); humeral angles acute, well developed
. *S. ancora* (Perty)
- 2. ♂ lateral plate free, not fused to pygofer (Fig. 21); abdomen red with a black tip (in most specimens); forewing and body coloration blackish; tibiae entirely dark
. *S. championi* Fowler
- ♂ lateral plate basally fused to pygofer (Fig. 27); abdomen uniformly light brown; forewing



Figs. 10-16. *Stylocentrus ancora*. 10, Head, anterior aspect (face). 11, Head, pronotum, and scutellum, anterolateral aspect. 12, Left metathoracic femur, tibia, and tarsus, ab lateral aspect. 13, Right forewing. 14, Female second valvulae, lateral aspect. 15, Male left lateral plate, lateral aspect. 16, Male aedeagus and left style, lateral aspect.

area between vein Cu and the claval suture. *Genitalia*: ♀: 2nd valvulae (Fig. 14) narrow throughout; dorsal ridge of apical 1/3 without distinct serrations. ♂: Lateral plates (Fig. 15) fused to pygofer, represented by lobe with truncate apex; styles (Fig. 16) elongate, clubbed apically, with preapical, dorsal irregularities; aedeagus (Fig. 16) U-shaped, anterior face of posterior arm not denticulate preapically; anterior arm of aedeagus arcuate.

Late-instar nymph.—Unknown.

Distribution.—Brazil [USNM]; French Guiana [NCSU]; Panama¹; Suriname¹; Guyana [NCSU]; Peru¹; Bolivia¹; Ecuador¹; Colombia [USNM]; Venezuela [IZAV].

Material examined.—Holotype not examined. Other specimens: 1 ♀ from CNCI; 2 ♀, 2 ♂ from IZAV; 1 ♀, 1 ♂ from MZLU; 10 ♀, 11 ♂ from NCSU (including Cryan Research #94-076a ♀ and Deitz Research #70-211i ♂); 1 ♂ from SEMC; 1 ♂ from SHMC; 9 ♀, 6 ♂ from USNM.

Remarks.—The pronotum and female second valvulae of *S. ancora* (Figs. 11, 14), the largest of the three *Stylocentrus* species, differ markedly from those of its congeners (Figs. 18, 20, 24, 26). Although it seems to be the most common species of *Stylocentrus* encountered in insect collections, there is no recorded information on its biology or life history.

The Latin specific name, “*ancora*,” translates as “anchor,” probably referring to the resemblance of the suprahumeral horns and an anchor.

Stylocentrus championi Fowler
(Figs. 17–22, 39)

Stylocentrus championi Fowler 1896c: 164.

Type locality.—Volcán de Chiriquí, Bugaba, Panama.

Diagnosis.—*Stylocentrus championi* has the suprahumeral horns and the posterior pronotal process arising from a very short stalk. The posterior pronotal process extends to near the apices of the forewings. Body coloration is generally black; abdom-

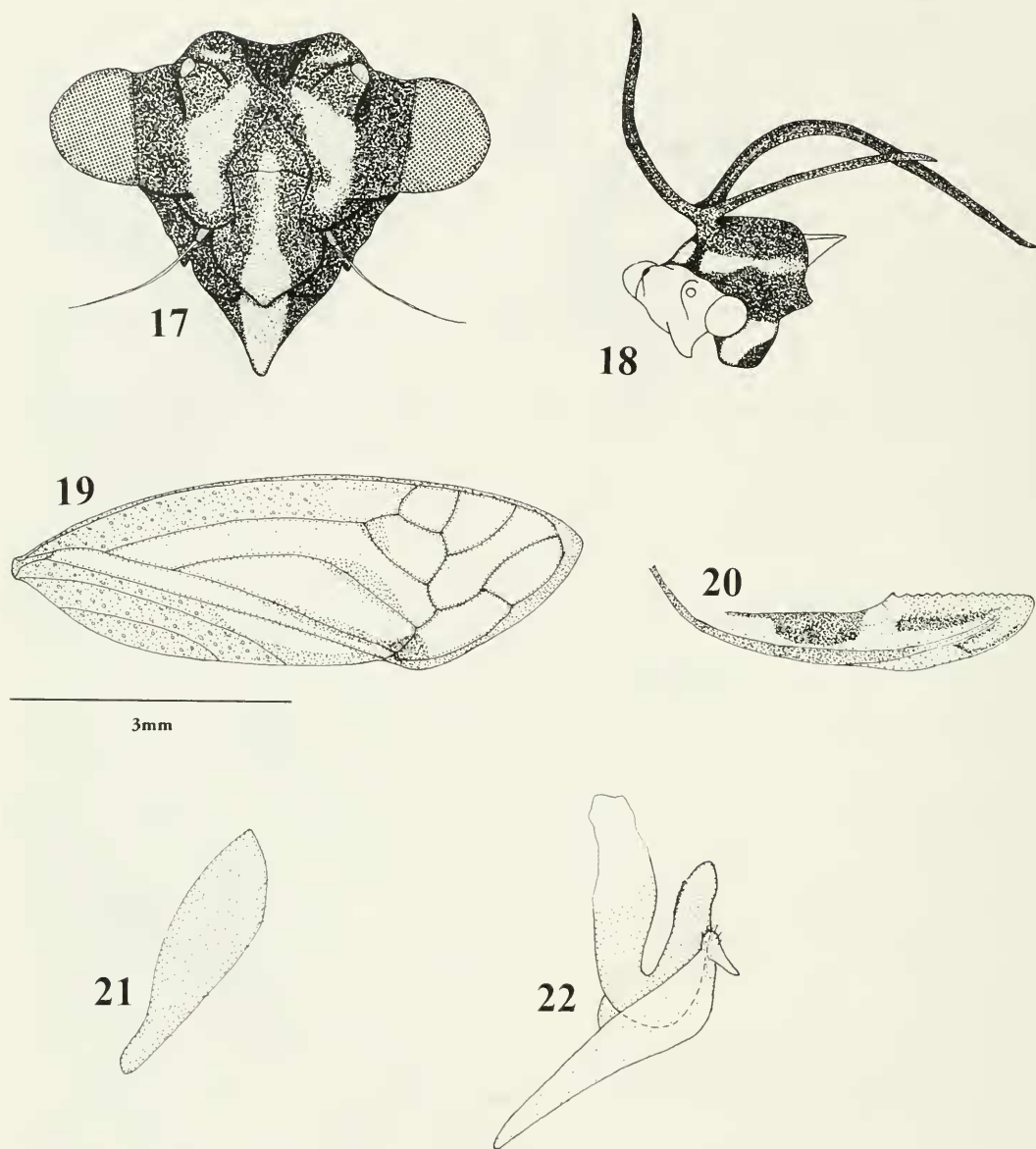
inal segments 1–7 red and 8–9 usually black.

Adult.—*Dimensions* (mm): Total length ♀ 5.8–6.0, ♂ 5.4–5.6; width between humeral angles ♀ 1.4–1.5, ♂ 1.4–1.5; pronotal length ♀ 5.1–5.2, ♂ 4.8–5.1; wing length ♀ 4.6–4.9, ♂ 4.6–4.9; maximum width of head across eyes ♀ 1.4–1.5, ♂ 1.4–1.5. *Coloration*: Head and thorax black (or, rarely, dark brown); facial area and metopidium may or may not bear pale, waxy secretions; legs dark brown to black (coxae and tarsi may be lighter); forewing black basally, hyaline from about 1/3 of their length with dark pigments surrounding veins, making veins appear thickened; abdomen red, usually with segments 8–9 black. *Structure*: *Head*: Face (Fig. 17) with fine pubescence; ocelli (on tubercles) located on dorsal projections; frontal plates not expanded. *Thorax*: *Pronotum* (Fig. 18): Suprahumeral horns and posterior process arising from very short stalk; suprahumeral horns rising dorsally and curving posteriorly; posterior process extending nearly full length of forewings. *Pronotal surface sculpturing* (Fig. 39): Bases of pit-associated setae strongly raised. *Scutellum* (Fig. 18): Short, black, elevated anteriorly, then flattening to acuminate apex; produced area without waxy secretions. *Forewing* (Fig. 19): Basal 1/3 coriaceous, excluding areas between veins M and Cu and between vein Cu and the claval suture; apical limb narrow. *Genitalia*: ♀: 2nd valvulae (Fig. 20) slightly broadened at about 2/3 of their length, tapering to apex; dorsal ridge of broadened area bearing distinct serrations. ♂: Lateral plates (Fig. 21) free, without hook; styles (Fig. 22) stout, hooked apically; aedeagus (Fig. 22) U-shaped, anterior face of posterior arm denticulate preapically.

Late-instar nymph.—Unknown.

Distribution.—Ecuador [QCAZ]; Venezuela [IZAV]; Panama [BMNH]; Honduras¹; Costa Rica [BYUC].

Material examined.—Lectotype [♀] [BMNH] with labels: “Type”, “LECTO-



Figs. 17–22. *Stylocentrus championi*. 17. Head of holotype, anterior aspect (face). 18. Head, pronotum, and scutellum of holotype, anterolateral aspect. 19. Right forewing. 20. Female second valvulae, lateral aspect. 21. Male left lateral plate, lateral aspect. 22. Male aedeagus and left style, lateral aspect.

TYPE", "V. de Chiriqui, 2–3,000 ft./Champion.", "Brit. Mus./1904-55.", "Stylocentrus/championi. Fowler/Type", and "LECTOTYPE/♀/Stylocentrus championi/Fowl./P.S. Broomfield, 1969; Paralectotype [♂ with suprahumeral horns partly broken] [BMNH] with labels: "Para-type", "PARA-LECTO-TYPE", "V. de Chiriqui, 25–4,000 ft./

Champion.", "Brit. Mus./1904-55.", "B.C.A. Homopt.II./Stylocentrus/championi/Fowl.", and "PARA-LECTOTYPE/Stylocentrus/championi/Fowl./P.S. Broomfield, 1969."; Paralectotype [♀ with suprahumeral horns and posterior pronotal process broken] [BMNH] with labels: "Para-type", "PARA-LECTO-TYPE", "Bugaba, 800–1,500 ft./

Champion", "B.C.A. Homopt.II/Stylocentrus/championi/Fowl.", "Brit. Mus./1904-55.", and "PARA-LECTOTYPE/Stylocentrus/championi/Fowl./P.S. Broomfield, 1969.". Other specimens: 1 ♀ from BYUC; 1 ♀ from EMUS; 2 ♀, 2 ♂ from IZAV; 2 ♀ from QCAZ; 7 ♀, 4 ♂ from TKWC (including Cryan Research #94-159b ♀ and Cryan Research #94-160a ♂); 1 ♂ from UCDC; 4 ♀, 1 ♂ from USNM.

Remarks.—Despite Funkhouser's (1940a) observation to the contrary, the pronota of *S. championi* and *S. rubrinigris* appear quite similar (Figs. 18, 24). However, the color patterns on the body and forewings are plainly different, as are the male lateral plate structures. *Stylocentrus championi*, the smallest of the three *Stylocentrus* species, tends to be blackish in color; the wings are usually hyaline between veins R and M, although some specimens from Venezuela (IZAV) have this space uniformly pigmented black, and two specimens (one from Ecuador, one from Peru, both in the NCSU collection) have brownish forewing pigmentation. The abdomen is red, with segments 8–9 black (in most specimens). The male lateral plates are free in *S. championi*, but are basally fused to the pygofer in *S. rubrinigris*. Host plant records for *S. championi* are limited to *Hamelia* sp. (Rubiaceae) (Wood 1984a) and *Miconia* sp. (Melastomataceae) (TKWC).

Fowler named *S. championi* in honor of the collector who provided the type series of this species, as well as other stegaspidine species.

Stylocentrus rubrinigris Funkhouser
(Figs. 23–28)

Stylocentrus rubrinigris Funkhouser 1940a: 276.

Type locality.—Callanga, Peru.

Diagnosis.—*Stylocentrus rubrinigris* has the suprahumeral horns and the posterior pronotal process arising from a short stalk. The posterior pronotal process extends to

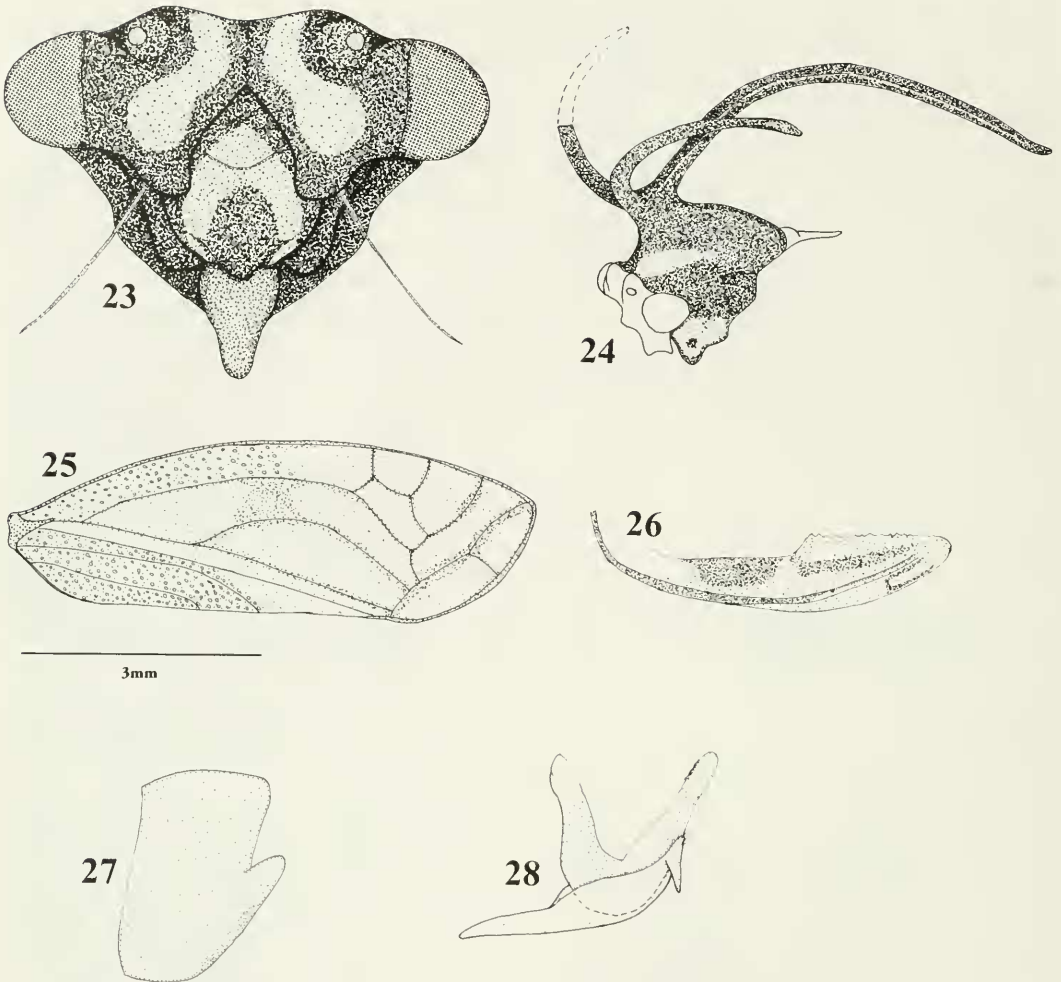
nearly $\frac{2}{3}$ the length the wings. Body coloration is generally brown.

Adult.—*Dimensions* (mm): Total length ♀ 6.2–6.4, ♂ 6.2; width between humeral angles ♀ 1.7–1.8, ♂ 1.6; pronotal length ♀ 6.7–6.8, ♂ —(pronotum broken); wing length ♀ 5.2–5.4, ♂ 5.2; maximum width of head across eyes ♀ 1.6–1.7, ♂ 1.6. *Coloration*: Head and thorax black with pale, waxy secretions in defined patterns; pronotum with brown patch above humeral angles; legs light brown with dark band at bases of tibiae; forewings brown basally, hyaline in distal $\frac{2}{3}$, with brown pigment forming a bridge between veins R and M; abdomen uniformly light brown. *Structure*: *Head*: Face (Fig. 23) with fine pubescence; ocelli (on tubercles) located on dorsal projections; frontal plates not expanded. *Thorax*: *Pronotum* (Fig. 24): Suprahumeral horns and posterior process arising from short stalk; suprahumeral horns rising dorsally and curving posteriorly; posterior process extending to about $\frac{2}{3}$ length of forewings. *Pronotal surface sculpturing*: Bases of pit-associated setae moderately raised. *Scutellum* (Fig. 24): Short, elevated anteriorly, then flattening to acuminate apex; elevated area dark (may or may not bear waxy secretions), flattened area lighter. *Forewing* (Fig. 25): Basal $\frac{1}{3}$ coriaceous, excluding areas between veins M and Cu and between Cu and claval suture; apical limbus narrow. *Genitalia*: ♀: 2nd valvulae (Fig. 26) abruptly broadened at $\frac{2}{3}$ length, tapered to apex; dorsal ridge of broadened area bearing distinct serrations. ♂: Lateral plates (Fig. 27) fused basally to pygofer, represented by lobe with rounded apex; styles (Fig. 28) stout, hooked apically; aedeagus (Fig. 28) weakly U-shaped, anterior face of posterior arm denticulate apically (teeth minute).

Late-instar nymph.—Unknown.

Distribution.—Peru [USNM]; Ecuador [NCSU]; Venezuela [CNCI]; Panama [CNCI].

Material examined.—Holotype [♀] [USNM] with labels: "Callanga/Peru",



Figs. 23–28. *Stylocentrus rubrinigris*. 23, Head of holotype, anterior aspect (face). 24, Head, pronotum, and scutellum of holotype, anterolateral aspect (dashed lines indicate broken portion of pronotum). 25, Left forewing of holotype (reversed). 26, Female second valvulae, lateral aspect. 27, Male left lateral plate, lateral aspect. 28, Male aedeagus and left style, lateral aspect.

“991.”, “WDFunkhouser/Collection/1962”, and “HOLOTYPE/*Stylocentrus rubrinigris*/W.D. Funkhouser”. Other specimens: 1 ♀ from AMNH; 2 ♂ from CNCI; 1 ♀, 1 ♂ from NCSU (including Cryan Research #94-160b ♂); 1 ♀ from USNM.

Remarks.—In many respects, *S. rubrinigris* resembles *S. championi*, but is paler in color, appearing brownish. The abdomen is not so brightly colored as in *S. championi*, and none of the distal segments are black. The tibiae are generally lightly colored,

with a narrow, dark band proximally. In addition, a “pigment bridge” is usually conspicuous in the forewing of *S. rubrinigris*, extending from R to M, and completely dividing the cell between those two veins. The host plants for this species are unknown.

The Latin specific name is a combination of “*rubri*” (from “*ruber*,” meaning “red”) and “*nigris*” (from “*nigror*,” meaning “blackness”), probably referring to the coloration of the type specimen.

Genus *Umbelligerus* Deitz 1975a
(Figs. 29–37)

Umbelligerus Deitz 1975a: 137. Type species: *Umbelligerus peruviansis* Deitz 1975a: 137, by original designation.

Diagnosis.—*Umbelligerus* has stalked ocelli, and the pronotal processes are umbelliform, antler-like, without inflated bulbs.

Adult.—*Dimensions* (mm): Total length (from anterior branches of suprahumeral horns to apex of forewings) 6.8–9.6. *Structure: Head* (Fig. 29): Ocelli and eyes stalked. *Thorax: Pronotum* (Figs. 30–32): Humeral angles stout; metopidium and lateral areas either brown or black and may have white longitudinal bands; suprahumeral horns and posterior process black, arising from long, central stalk; suprahumeral horns variably branched; posterior process long, sinuate, spinelike. *Pronotal surface sculpturing* (Fig. 40): Surface granulate and punctate; pits round or slitlike, widely spaced, each associated with one short seta. *Scutellum* (Figs. 30–32): Inflated anteriorly, flat and acuminate apically. *Legs* (Fig. 33): Metathoracic tibiae without cucullate setae in rows I and III (except *U. woldai*, which has cucullate setae in rows II and III). *Forewings* (Fig. 34): Base weakly coriaceous (except area between vein Cu and claval suture); 1 r-m and 1 m-cu crossvein present. *Genitalia: ♀*: 2nd valvulae (Fig. 35) short and broad, curved dorsally, distal 1/3 of dorsal ridge with small serrations. *♂*: Lateral plates (Fig. 36) slim, fused to pygofer basally; aedeagus and styles (Fig. 37) relatively stout; aedeagus with anterior face of posterior arm denticulate preapically.

Late-instar nymph.—Unknown for all species.

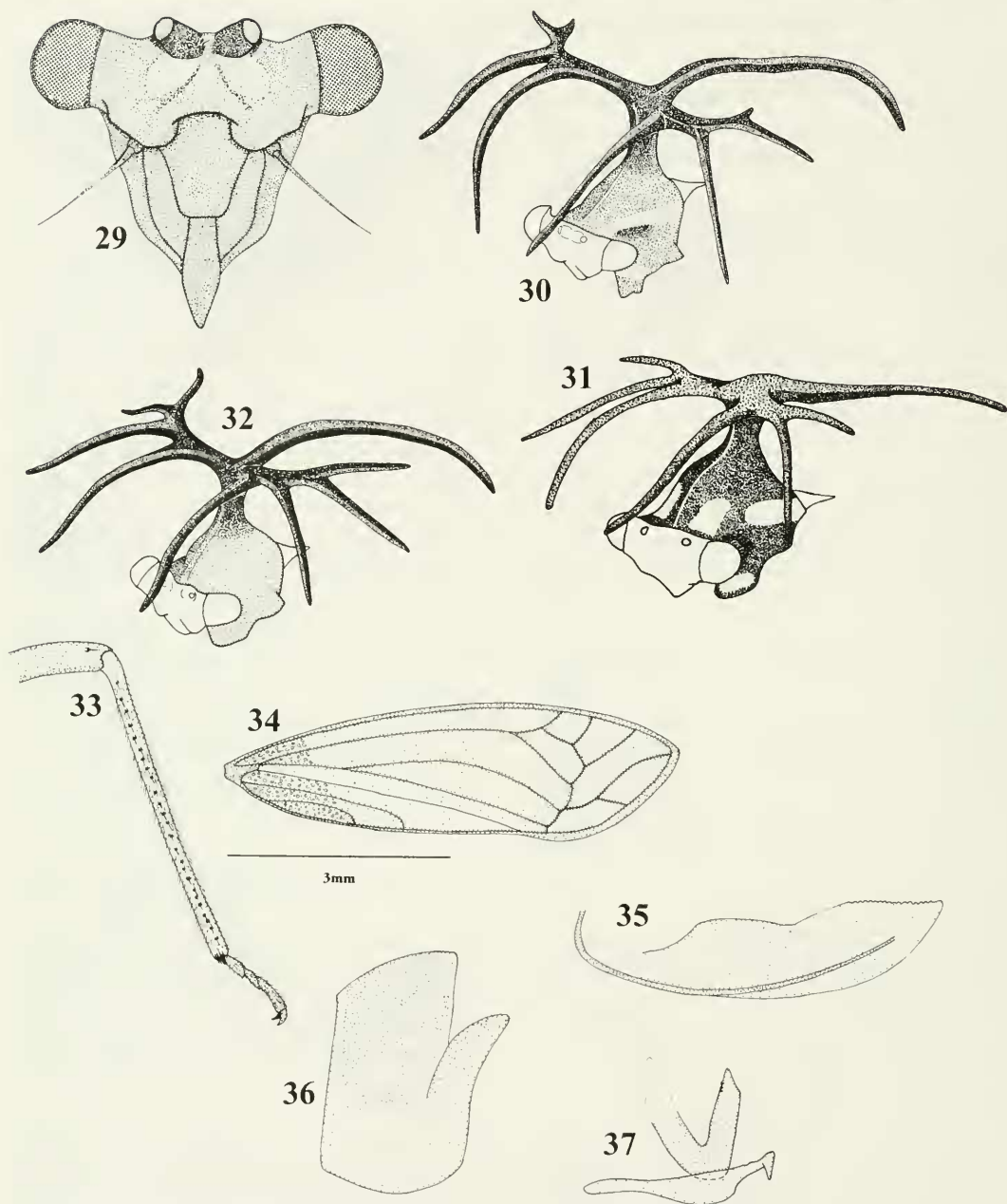
Range.—Brazil [SHMC]; Peru [NCSU]; Guyana [BMNH]; Venezuela [IZAV], Panama [DZUP]; Costa Rica [INBC].

Material examined.—*Umbelligerus peruviansis* Deitz: Holotype [♂] [USNM] with labels: “Hacienda Maria/Cusco, Peru/March 12, 1952/FL. Woytkowski”, “Along

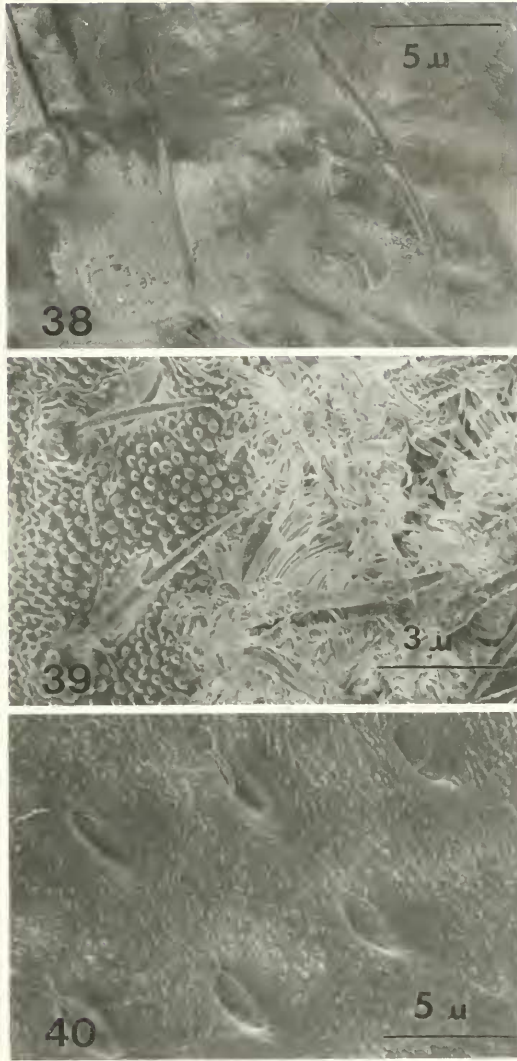
R. Cosnipata/tropical jungle/900 m.a.s.l.”, “Deitz Research/70-211f ♂”, “HOLOTYPE/*Umbelligerus/peruviansis*/Deitz/1975”, and “ON INDEFINITE LOAN/FROM N. CAROLINA/ST. UNIV. RALEIGH”. Paratype [♂] [NCSU] with labels: “Hacienda Maria/Cusco, Peru/March 19, 1952/FL. Woytkowski”, “Along R. Cosnipata/tropical jungle/900 m.a.s.l.”, “Deitz Research/72-13a ♂”, and “PARATYPE/*Umbelligerus/peruviansis*/Deitz/1975”. Paratype [♀, dissected] [USNM] with labels: “Hacienda Maria/Cusco, Peru/March 21, 1952/FL. Woytkowski”, “Along R. Cosnipata/tropical jungle/900 m.a.s.l.”, “Deitz Research/70-211g ♀”, and “PARATYPE/*Umbelligerus/peruviansis*/Deitz/1975”. Other specimens: 1 ♂ from BMNH; 1 ♀ from INBC; 2 ♀, 2 ♂ from IZAV; 3 ♀, 1 ♂ from SHMC; 1 ♂ from USNM. *Umbelligerus furcillatus* Sakakibara: Holotype [♀] [DZUP] with labels: “Caruaru.PE/II-1972/M. Alvarenga” and “HOLOTYPUS/*Umbelligerus/furcillatus*/A.M. Sakakibara 1981”. *Umbelligerus woldai* Sakakibara: Type not examined. *Other material*: 1 ♀ from BMNH; 1 ♂ from DZUP; 4 ♀ from INBC.

Remarks.—Sakakibara (1981a) published a review of the genus *Umbelligerus*, describing two new species. *Umbelligerus* species are remarkable insects, similar in appearance to *Stylocentrus* and, to a lesser degree, *Bocydium*. Although records indicate that they are widely distributed, *Umbelligerus* specimens seem to be uncommon in collections. No records of host plants or life histories are available for this genus—labels on some specimens indicate that they were collected at mercury vapor and black lights.

If the lowest number of suprahumeral horn branches represents the plesiomorphic condition, then *U. furcillatus* has the most primitive state of the three *Umbelligerus* species. Nevertheless, this species has cucullate setae only in row II of the metathoracic tibia, whereas *U. woldai* has cucullate setae in both rows II and III (a more ple-



Figs. 29-37. *Umbelligerus* species. 29, *U. peruvienis*, head, anterior aspect (face). 30-32, Head, pronotum, and scutellum, anterolateral aspect of *U. peruvienis*, *U. furcillatus* holotype, and *U. woldai*, respectively. 33, *U. peruvienis*, left metathoracic femur, tibia, and tarsus, ablateral aspect. 34, *U. peruvienis*, right forewing. 35, *U. peruvienis*, female second valvulae, lateral aspect. 36, *U. peruvienis*, male left lateral plate and pygofer, lateral aspect. 37, *U. peruvienis*, male aedeagus and left style, lateral aspect.



Figs. 38–40. Pronotal surface sculpturing of Stegaspidini. 38, *Flexocentrus felinus*. 39, *Stylocentrus championi*. 40, *Umbelligerus peruviansis*.

siomorphic condition). *Umbelligerus peruviansis* has cucullate setae only in row II and a pronotal structure that suggests it is an intermediate between the other two, regardless of which of those is the more plesiomorphic species.

The generic name is a combination of the Latin terms “umbell” (from “umbella,”

meaning “umbrella”) and “igerus” (a suffix from “gero,” meaning “bearer or carrier”), referring to the umbrella like suprahumeral horns.

KEY TO SPECIES OF ADULT *UMBELLIGERUS*

1. Each suprahumeral horn with 4 distinct branches (Fig. 32) *U. woldai* Sakakibara



Fig. 41. Geographic distribution of Stegaspidini genera. Distribution records are summarized for all genera of Stegaspidini. Latitudinal limits are not indicated. Genera abbreviations are as follows: Boc = *Bocydium*; Fle = *Flexocentrus*; Lir = *Lirantia*; Lyc = *Lycoderes*; Oed = *Oeda*; Sme = *Smerdalea*; Ste = *Stegaspis*; Sty = *Stylocentrus*; Umb = *Umbelligerus*.

- Each suprahumeral horn with fewer than 4 distinct branches (Figs. 30-31) 2
- 2. Pronotum black with pale waxy secretions; each suprahumeral horn with 3 distinct branches (Fig. 31) *U. furcillatus* Sakakibara
- Pronotum brown with black processes, and often with pale waxy secretions; each suprahumeral horn with 3½ branches (posterior-most branches with small spines: Fig. 30) *U. peruviansis* Deitz

SPECIES CHECKLIST OF *UMBELLIGERUS*
furcillatus Sakakibara
Umbelligerus furcillatus Sakakibara
 1981a: 67.
peruviansis Deitz
Umbelligerus peruviansis Deitz 1975a:
 137.
woldai Sakakibara

Umbelligerus woldai Sakakibara
1981a: 67.

SUMMARY

We summarized recent taxonomic changes in the tribe Stegaspini in the first part of this review series (Cryan and Deitz 1999a, Table 1). Currently, two included genera are monotypic: *Flexocentrus* (*F. fel-*

inus, for which both sexes are known) and *Lirania* (*L. bituberculata*, known only from a female specimen). Immature stages are unknown for all species of the genera *Lirania*, *Oeda*, *Stylocentrus*, and *Umbelligerus*.

The geographical distributions for the genera of Stegaspini are summarized in Fig. 41. Information concerning host plants used by species of Stegaspini is woefully deficient. Reliable host records are available for only a few species in the genera *Bocydium* (Cryan and Deitz 1999a), *Lycoderes* (Cryan and Deitz 1999b), *Oeda* (Cryan and Deitz 1999b), and *Stylocentrus* (above). We present an index to the known host plants of Stegaspini in Table 1.

Stegaspini is the nominate tribe of Stegaspinae, one of the more plesiomorphic membracid subfamilies (Dietrich and Deitz 1993a). The evolutionary relationships among the tribes and genera of Stegaspinae will be explored in a forthcoming phylogenetic analysis of the subfamily (Cryan and Deitz in preparation).

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Table 1. Index to host plants of Stegaspini.

<i>Bellucia</i> sp., Melastomataceae:
<i>Lycoderes serraticornis</i>
<i>Cecropia</i> sp., Moraceae:
<i>Oeda inflata</i>
<i>Hamelia</i> sp., Rubiaceae
<i>Stylocentrus championi</i>
Melastomataceae, unidentified:
<i>Bocydium astilatum</i>
<i>Bocydium nigrofasciatum</i>
<i>Lycoderes serraticornis</i>
<i>Lycoderes petasus</i>
<i>Miconia</i> sp., Melastomataceae:
<i>Bocydium globulare</i>
<i>Lycoderes phasianus</i>
<i>Stylocentrus championi</i>
<i>Pithocarphyia poeppigiana</i> (D.C.) Baker aff., Astera-
ceae:
<i>Bocydium cubitale</i>
Unidentified green vines and shoots in shaded places:
<i>Stegaspis fronditia</i> [as <i>Stegaspis galeata</i>]
Unidentified low shrubs in shaded places:
<i>Lycoderes hippocampus</i>
Unidentified shrub, in clearings, with reddish powder
on twigs and leaf undersides (possibly <i>Vismia</i> sp.):
<i>Stegaspis fronditia</i> [as <i>S. laevipennis</i>]
Unidentified slender, struggling tree:
<i>Stegaspis fronditia</i> [as <i>S. laevipennis</i>]
Unidentified small tree, in clearings, with reddish
powder on twigs and leaf undersides (possibly <i>Vis-</i>
<i>mia</i> sp.):
<i>Flexocentrus felinus</i>
<i>Vismia</i> sp., Guttiferae
<i>Bocydium</i> sp.
<i>Flexocentrus felinus</i>
<i>Lycoderes</i> sp.
(?) <i>Stegaspis</i> spp.

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